Japanese Utility Model Application (U) Hei 2(1990)-19489

Specification

1. Title of the Utility Model

MASTER ARM

2. Scopes of Utility Model Claim

A master arm having seven spindles in total of six arm joint spindles and one leading end working spindle, characterized in that the joint spindles are arranged in such a manner that the joint spindles corresponding to a shoulder turn and an elbow turn of a slave arm among the six arm joint spindles are located below a lower arm, and a lower arm rest on which a lower arm of an operator can be rested is provided.

3. Detailed Description of the Utility Model

(Field of the Industrial Application)

The present utility model application relates to a master art of various manipulators or automated equipment that belongs to those manipulators for the purpose of improving the operability.

(Prior Art)

A multi-joint manipulator that arbitrarily operates due to external operation has been frequently employed at dangerous locations to an operator. As one of command methods of operating the above manipulator, there is a method that is called "master slave system". The master slave system is a

command method that sets an input side master arm to a configuration identical with or analogous to the slave manipulator, and inputs operation to be conducted by the slave manipulator to the master arm to arbitrarily operate the slave manipulator.

(Problem to be solved by the Utility Mode)

However, as shown in Fig. 4, the manipulator of the above system has plural joints 101 to 107 that conduct bend and turn. Also, since the master arm has the same configuration as that of the manipulator (hereinafter referred to as "slave arm 100") or an analogous configuration even if the size is smaller, the manipulator has the same number of joints as that of the joints of the slave arm 100. Accordingly, not only the master arm becomes large in size, but also when all of the spindles of the master arm are operated by one hand, another joint not intended by the master arm may be accompanied to conduct unnecessary operation. Since the unnecessary motion is transmitted to the slave arm 100 as it is, a portion of the master arm which conducts the unnecessary motion is supported by one hand to prevent the unnecessary motion from occurring up to now. For that reason, there arises such a problem that one-hand operation cannot be conducted, and accurate and quick operation is not conducted.

For example, in the structure of an arm of the free degree of general multiple junctions 7 shown in Fig. 4 (the slave and

the master are identical in the structure), in the case where the master arm is going to be operated, because both of a II spindle 102 and a III spindle 103 are turn spindles, when only one spindle is going to be moved, the other spindle is frequently moved along with one spindle. When the movement of the other spindle is restricted by a brake, the brake operation for each of the spindles must be appropriately switched on/off with respect to an arbitrary spindle during the operation of the arm. As a result, this method is not in a practical use, and the operation by only one hand cannot be realized (In Fig. 4, the I spindle 101 is rotating, the II spindle 101 and the III spindle 103 are turning, a IV spindle 104 is rotating, a V spindle 105 is turning, a VI spindle 106 is rotating, and a VII spindle 107 is gripping, from a fixed side 108.)

(Means for Solving the Problem)

In order to solve the above problem, according to the present utility model, there is provided a master arm having seven spindles in total of six arm joint spindles and one leading end working spindle, characterized in that the joint spindles are arranged in such a manner that the joint spindles corresponding to a shoulder turn and an elbow turn of a slave arm among the six arm joint spindles (II spindle 102 and IV spindle 103 in an example of Fig. 3) are located below a lower arm, and a lower arm rest on which a lower arm of an operator can be rested is disposed.

(Action)

As described above, according to the master arm of this utility mode, since the lower arm of the operator is rested on the lower armrest on the master arm to conduct the operation, it becomes easy that a junction that is going to be moved together is supported, and only the intended junction is operated. As a result, all of the spindles can be operated by only one hand.

(Embodiments)

Hereinafter, a description will be given of a master arm according to the present utility model with reference to an embodiment shown in the drawings.

Figs. 1 to 3 are a plan view, a front view, and a left side view showing a master arm according to an embodiment of the present utility model, respectively. Reference numeral 1 denotes an operation beam that is gripped by an operator, which slidably supports a seventh spindle operation level 2 in a direction indicated by an arrow VII in Figs. 1 and 3. The operation beam 1 is rotatably supported by a sixth spindle 3 about the center of an axial core 4 of the sixth spindle 3. In addition, the sixth spindle 3 is rotatably supported by a fifth spindle 5 about the center of an axial core 6 of a fifth spindle 5 which is orthogonal to the axial core 4. As described above, a fourth spindle 7, a third spindle 9, a second spindle 11, and a first spindle 13 are rotatably supported about the centers

of the axial cores 8, 10, 12 and 14 with respect to upstream spindles (spindles smaller in spindle No.) or a support 15, respectively.

The sixth spindle 3 to the first spindle 13 act as indicated by arrows in the figures.

Also, the operation lever 2, and position command signal generators (for example, potentiometers or encoders) (not shown) and retaining mechanisms (for example, brakes) (not shown) are assembled within the operation beam 1, the sixth spindle 3, the fifth spindle 5, the fourth spindle 7, the third spindle 9, the second spindle 11, and the first spindle 13, respectively.

On the other hand, a rest 16 is disposed on an upper portion of the fourth spindle 7 so as to rest a lower arm of the operator thereon.

In the case of operating the master arm thus structured according to the present utility model, the lower arm of the operator is rest on the upper portion of the rest 16, and the operation beam 1 is gripped. In the case where the master arm is operated in the above manner, for example, to operate the second spindle 11 and the third spindle 9 which are frequently rotated together in general, the entire arm is moved in the forward and backward direction so that an angle of the elbow of the operator is not changed when the second spindle 11 is operated. Then, the operation of the third spindle 9 is moved

in such a manner that the angle of the elbow is changed so that the position of the entire arm is not changed. As a result, those spindles are not rotated together.

As described above, in the master arm according to the present utility model, the unintended spindle is not rotated together even when the operation is conducted by one handle. Also, the motions of the elbow, the shoulder and the arm of the operator generally well coincide with the motions of the corresponding joints of the slave arm (that is, there are many cases in which the slave arm is structured such that the second spindle is the shoulder, and the third spindle is the elbow). As a result, the operation of the master arm by one hand is extremely readily conducted.

Although an object of the present utility model is the same as that of Japanese Utility Model Application Sho 62(1987)-081264, a different from that application resides in such advantages that the rest 16 is additionally provided to set the configuration of the arm of the operator to a more easily operated configuration, an the height and the length of the rest are so adjusted as to relatively freely select the positional relationship of the respective junctions of the master arm.

(Advantages of the Utility Model)

As was described above with reference to the embodiment shown in the drawings, in the master arm according to the present utility model, the master arm as means for supplying

a command signal for operating the slave arm is made up of seven spindles in total consisting of six arm junction spindles and one working spindle, and the lower arm rest is disposed so that the unintended spindle is not rotated even if the operation is conducted by one hand. As a result, the master arm can be portable because of the small size, and only the intended junction is easily operated.

4. Brief Description of the Drawings

Figs. 1 to 3 are a plan view, a front view and a left side view showing a master arm according to an embodiment of the present utility model, and Fig. 4 is a conventional junction structural diagram.

Reference numeral 1 is an operating shaft, 2 is a seventh spindle operation lever, 3 is a sixth spindle, 4 is a sixth spindle core, 5 is a fifth spindle, 6 is a fifth spindle core, 7 is a fourth spindle, 8 is a fourth spindle core, 9 is a third spindle, 10 is a third spindle core, 11 is a second spindle, 12 is a second spindle core, 13 is a first spindle, 14 is a first spindle core, 15 is a support, and 16 is a lower armrest.

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審査請求　未請求　請求項の数 1　（全2頁）

㊹考案の名称　マスタアーム

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㊼実用新案登録請求の範囲

アーム関節軸として6軸および先端作業用軸1軸の計7軸を有するアームにおいて、アーム関節軸6軸のうちスレーブアームの肩旋回とひじ旋回に相当する関節軸を下腕の下方に位置するように関節軸を配置するとともに、操作者の下腕を載せることができるような下腕載せ台を設けたことを特徴とするマスタアーム。

図面の簡単な説明

第1図ないし第3図は本考案に係るマスタアームの実施例を示す平面図、正面図および左側面図、第4図は従来方式の関節構成図である。

1……操作軸、2……第7軸操作レバー、3……第6軸、4……第6軸軸芯、5……第5軸、6……第5軸軸芯、7……第4軸、8……第4軸軸芯、9……第3軸、10……第3軸軸芯、11……第2軸、12……第2軸軸芯、13……第1軸、14……第1軸軸芯、15……支持台、16……下腕載せ台。

第　1　図